3D Claw Match

Comp 410 Term Project

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Game Design

1 - How to Play

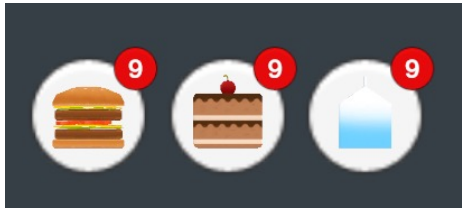
Goal of the game is to blast the target objects for the required amount before the time is up.

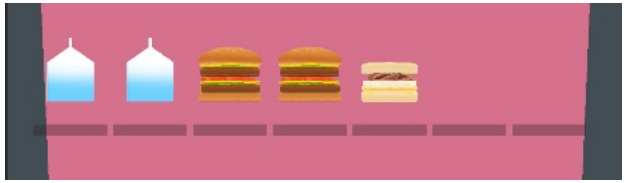
To collect an object and add it to bag, user needs to press on it from the Claw Machine.

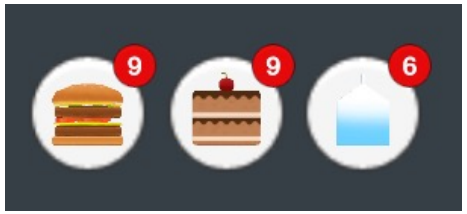
To blast an object, user needs to collect three objects of the same type inside their bag.

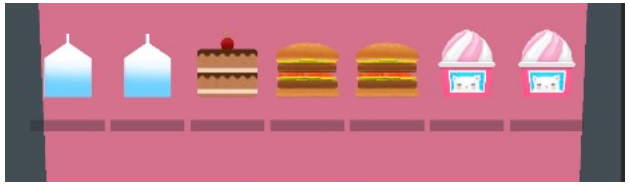
Beware! If bag is full and yet the level is not passed, player will lose.

By using the left and right buttons, user can rotate the Claw Machine to see objects from a different face, allowing them to collect objects that are not visible from one face.









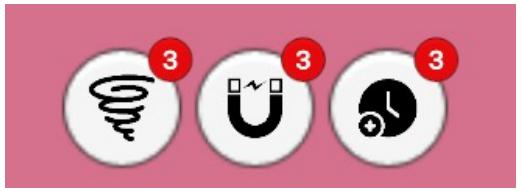
Game Design

2 - Powerups

At each level, user will be given some amount of powerups.

There are three types of powerups:

- Tornado: Scatter all the objects inside the Claw Machine.
- Magnet: Blast three objects of the same type from the Claw Machine.
- Extra Time: Add an extra time.



Computer Graphics Concepts Used

1- Rotation

Based on button inputs, Claw Machine rotates for 90 degrees around its own Y axis.

```
Event function  Bartu Uzun +1
private void Update()
{
    if (!_isRotating) return;

    if (_currentRotationTime >= _rotationTime)
    {
        FinishRotation();
    }

    float rotationAngle = Mathf.Lerp( a: _currentRotation,  b: _rotationAngle * _rotationDirection,  t: Time.deltaTime);
    boxParentTransform.Rotate(_rotationAxis,rotationAngle , relativeTo: Space.Self);

    _currentRotationTime += Time.deltaTime;



}
```

Computer Graphics Concepts Used

2-Handling User Inputs, Raycast

Besides the buttons for rotation and powerups, user can press on the screen to collect an object. This collection is implemented using Raycasting.

When user presses on the screen, that screen coordinate is transformed into a ray inside the world coordinate system. If this ray hits an object, that object is collected

```
Event function  Batuhan Arat *
private void Update()
{
    if (!_isAvailableForTouch) return;


    if (Input.GetMouseButtonDown(0))
    {
        Ray ray = Camera.main.ScreenPointToRay(Input.mousePosition);
        RaycastHit hit;

        if (Physics.Raycast(ray, out hit))
        {
            ObjectType myEnum;
            string tag = hit.collider.gameObject.tag;
            if (Enum.TryParse(tag, out myEnum))
            {
                BagSignals.Instance.onItemSelected?.Invoke(myEnum);
            }
            Destroy(hit.collider.gameObject);
        }
    }
}

}
```

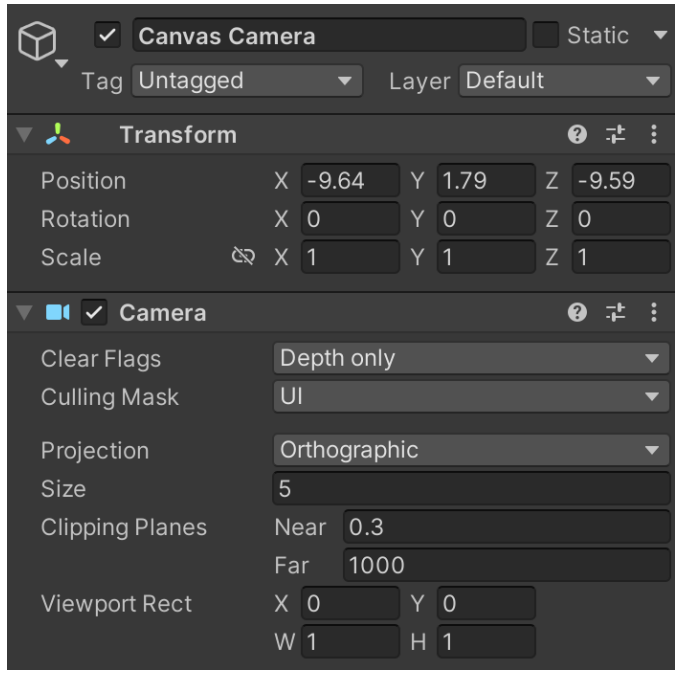
Computer Graphics Concepts Used

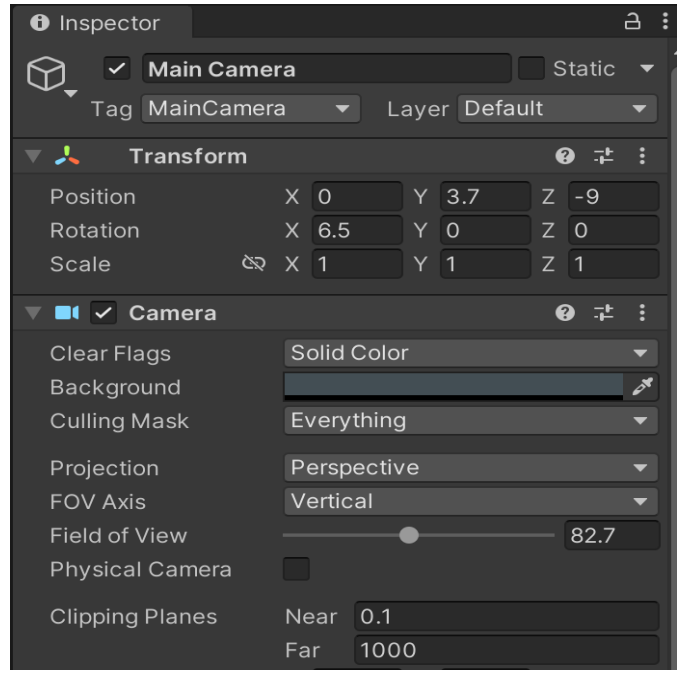
3- Projection

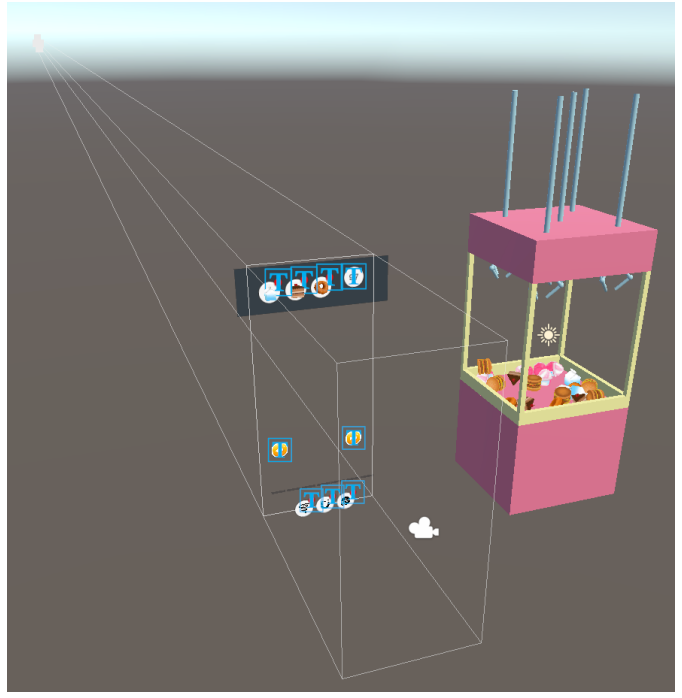
There are two cameras located inside our game.

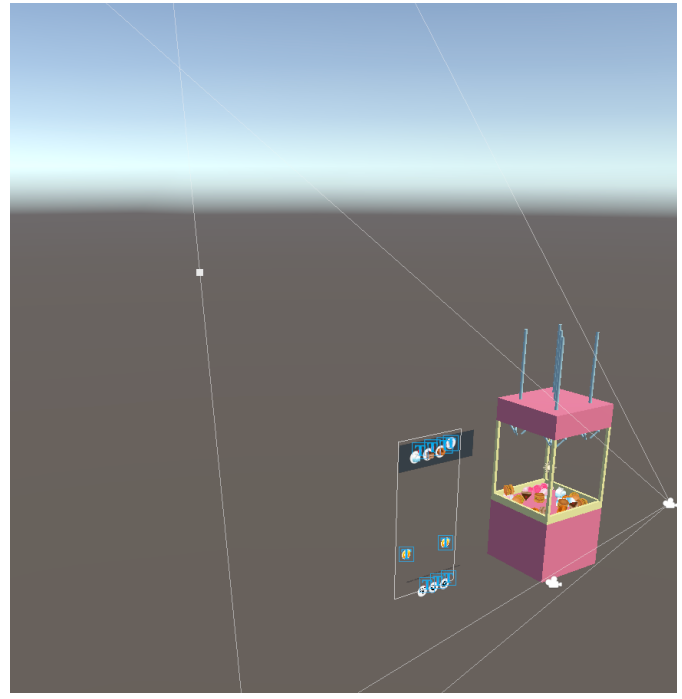
One is the main camera that uses Perspective Projection to view the 3D game world.

The other is the canvas camera that uses Orthographic Projection to view the UI canvas. This way, though we use 3D models inside our UI, they look 2D.









Computer Graphics Concepts Used

4-Shaders

Unity3D provides a wide variety of prebuilt shaders that are easy to use.

Our collectible objects (cake, donut, hamburger, etc) use Unity's Unlit/Texture shader, as they utilize texture mapping.

Our Claw Machine uses Unity's Standard shader.